

30 Preliminary Assessment of Water Chemistry Related to Groundwater Flooding in Wawarsing, New York, 2009–11

Table 4. Concentrations of dissolved gases and age tracers, redox properties, and apparent age of surface-water and groundwater samples from a lake, New York, 2009–11.

[--, not measured; <, less than; E, estimated value below minimum reporting level; NP, age estimate not possible; C, current age; apparent recharge years and ages for redox, oxidation-reduction; O₂, oxygen reducing; NO₃⁻, nitrate reducing; Mn, manganese reducing; Fe, iron reducing; SO₄²⁻, sulfate reducing; FeSO₄, iron- to sulfate-unless otherwise noted; mol/kg, moles per kilogram; pptv, parts per trillion by volume; pmol/kg, picomoles per kilogram; cm³STP/L, cubic centimeters at standard

Well identifier	Date	Sample time	Dissolved oxygen (DO)	Sulfide (H ₂ S) ¹	Methane (CH ₄) ¹	Nitrogen (N ₂) ¹	Argon (Ar) ¹	Carbon dioxide (CO ₂) ¹	Redox class category	Predominant redox process	Recharge temp (degrees Celsius) ¹	Excess air (cm ³ STP/L) ¹	Tritium, picocuries per liter ²	SF ₆ in water (femto-mol/kg) ³	Calculated SF ₆ partial pressure (pptv) ³
U1626	12/15/2009	1500	4.4	0.002	<0.001	✓21	0.74	42	Mixed (oxic/sulfidic)	O ₂ -SO ₄ ²⁻	8.6	2.3	26.1	2.86	5.55
U1627	6/23/2009	1200	5.6	<0.002	--	--	--	--	Oxic	O ₂	--	--	--	--	--
U1627	4/1/2010	0900	8.6	<0.002	<0.001	23	0.86	30	Oxic	O ₂	6	3.9	27.5	3.59	5.65
U1637	8/31/2010	1400	3	--	--	--	--	--	Mixed (oxic-methanogenic)	O ₂ -Fe(III)	--	--	<0.03	--	--
U1641	4/20/2010	1300	0.8	0.014	0.002	22	0.75	1.6	Mixed (oxic-methanogenic)	O ₂ -CH ₄	10.1	4.1	1.1	0.273	0.479
U1641	4/20/2010	1301	--	--	--	--	--	--	--	--	10.1	4.1	1.1	0.279	0.489
U1663	8/31/2010	1400	2.9	--	--	--	--	--	Oxic	O ₂	--	--	17.7	--	--
U1673	11/30/2011	1200	0.5	<0.002	0.0087	22.0	0.76	3.6	Mixed (oxic-methanogenic)	O ₂ -CH ₄	7.8	3.8	0.20	1.03	1.77
U1670	11/30/2011	1000	0.6	<0.002	0.012	23.4	0.77	2.9	Mixed (oxic-methanogenic)	O ₂ -CH ₄	9.6	6.0	0.30	--	--
U1632	9/14/2009	1730	5.9	--	<0.001	20	0.72	30	Oxic	O ₂	10.0	0.7	14.8	2.50	6.25
U1633	9/15/2009	1200	8.5	--	--	--	--	--	Oxic	O ₂	8.7	1.5	--	--	--
U1667	9/15/2009	1400	9.9	--	--	--	--	--	Mixed (oxic-anoxic)	O ₂ -Mn(IV)	--	--	--	--	--
U1668	7/1/2009	1300	9.5	--	--	--	--	--	Mixed (oxic-anoxic)	O ₂ -Mn(IV)	--	--	--	--	--
U1666	6/23/2009	1400	5.0	--	<0.001	17	0.64	74	Oxic	O ₂	12.3	0	60	2.39	6.77
U1666	3/31/2010	1600	7.7	--	<0.001	23	0.84	44	Oxic	O ₂	6	2.0	26.9	3.42	5.75
U1665	3/31/2010	1200	6.4	E0.001	<0.001	24	0.88	28	Oxic	O ₂	1.2	2.2	24.8	3.72	5.55
Lippman Lake effluent	6/24/2009	1330	--	--	--	--	--	--	O ₂ ≥ 0.5 mg/L	--	--	--	--	--	--
Lippman Lake effluent	7/2/2009	1300	8.9	--	--	--	--	--	O ₂ ≥ 0.5 mg/L	O ₂ -Mn(IV)	10*	0	--	--	--
Lippman Lake effluent	9/1/2009	1230	--	--	--	--	--	--	O ₂ ≥ 0.5 mg/L	--	--	--	--	--	--
Lippman Lake effluent	9/16/2009	1300	11	--	--	--	--	--	Oxic	O ₂	--	--	--	--	--
Lippman Lake effluent	10/13/2009	1515	--	--	--	--	--	--	O ₂ ≥ 0.5 mg/L	--	--	--	--	--	--
Lippman Lake effluent	12/15/2009	1000	7.3	--	--	--	--	--	Mixed (oxic-anoxic)	O ₂ -Mn(IV)	7#	0	--	--	--
Lippman Lake effluent	4/1/2010	1200	9.9	--	--	--	--	--	Mixed (oxic-anoxic)	O ₂ -Mn(IV)	--	--	--	--	--
01366400	6/23/2009	0930	9.6	--	--	--	--	--	Oxic	O ₂	10*	0	--	--	--
01366400	9/1/2009	1030	--	--	--	--	--	--	Oxic	O ₂	--	--	--	--	--
01366400	10/13/2009	1420	--	--	--	--	--	--	O ₂ ≥ 0.5 mg/L	--	--	--	--	--	--
01366400	10/13/2009	1425	--	--	--	--	--	--	O ₂ ≥ 0.5 mg/L	--	--	--	--	--	--
01366400	12/22/2009	1110	--	--	--	--	--	--	Oxic	O ₂	7*	0	--	--	--

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Well identifier	Date	Sam- ple time	Dissolved oxygen (DO) ¹	Sulfide (H ₂ S) ¹	Methane (CH ₄) ¹	Nitro- gen (N ₂) ¹	Argon (Ar) ¹	Carbon diox- ide (CO ₂) ¹	Redox class category	Predominant redox process	Re-charge temp (degrees Celsius) ¹	Excess air (cm ³ STP/L) ¹	Tritium, picocu- ries per liter ²	SF ₆ in water (femto- mol/kg) ³	Calcu- lated SF ₆ partial pressure (pptv) ³
01366400	4/1/2010	1000	9.9	--	--	--	--	--	Oxic	O ₂	5.4*	0	--	--	
U1625	6/24/2009	1100	3.2	<0.002	<0.001	19.0	0.72	4.5	Oxic	O ₂	8	0.65	27.2	2.4	
U1625	12/14/2009	1000	2.1	0.093	0.022	22.5	0.8	23.1	Mixed (oxic/ methanogenic)	O ₂ -CH ₄	9.4	4.5	25.3	2.85	
U1629	6/24/2009	0800	<0.2	0.56	15	22.0	0.78	5.5	Anoxic	Fe(III)-SO ₄ ²⁻ -CH ₄	7.3	3.2	19.5	0.0282	
U1628	7/2/2009	1000	0.6	1.2	0.16	31.0	0.98	1.2	Mixed (oxic/ methanogenic)	O ₂ -CH ₄	NP	NP	8.3	0.13	
U1630	9/15/2009	1700	1.5	0.012	<0.001	48.0	1.4	2.2	Mixed (oxic/ sulfidic)	O ₂ -Mn(IV)-SO ₄ ²⁻	NP	NP	3.7	1.17	
U1631	9/16/2009	1000	1.4	0.65	0.51	34.0	1.07	3.8	Mixed (oxic/ methanogenic)	O ₂ -Fe(III)-CH ₄	NP	NP	2.9	0.86	
U1631	9/16/2009	1001	1.4	0.65	0.5	33.0	1.05	3.8	Mixed (oxic/ methanogenic)	O ₂ -Fe(III)-CH ₄	NP	NP	2.6	0.50	
U1631	12/14/2009	1630	1.8	2.3	0.34	33.0	1.05	2.2	Mixed (oxic/ methanogenic)	O ₂ -SO ₄ ²⁻ -CH ₄	NP	NP	2.8	0.50	
U1647	4/21/2010	1300	<0.2	2.0	18	36.0	1.10	3.4	Anoxic	Mn(IV)-CH ₄	NP	NP	<0.3	0.32	
U7017	9/20/2011	1200	<0.2	0.039	13	25.8	0.88	13.4	Anoxic	Mn(IV)-CH ₄	3.0	5.4	4.1	0.0888	
U3772	9/20/2011	1200	<0.2	0.006	6.2	24.0	0.83	1.3	Anoxic	Fe(III)-CH ₄	4.5	4.3	0.70	0.446	
U1645	9/21/2011	1200	0.4	0.023	0.054	22.1	0.77	6.1	Anoxic	Mn(IV)-CH ₄	7.6	3.6	15	0.141	
U1644	9/21/2011	1200	<0.2	0.80	16	23.4	0.84	2.5	Anoxic	Mn(IV)-CH ₄	3.3	2.9	8.1	0.17	
														0.26	

¹Analyzed or estimated at the U.S. Geological Survey (USGS) Dissolved Gas Laboratory, Reston, Va.

²Analyzed at a USGS contract laboratory.

³Analyzed or estimated at the USGS CFC Laboratory, Reston, Va.

*Estimated based on mean annual temperature.

*Estimated based on sample temperature.

*Estimated based on average air temperature for November and December at Wawarsing, N.Y.

Contaminant	MCL or TT ¹ (mg/L) ²	Potential health effects from long-term ³ exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L) ²
OC Hexachlorobenzene	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories	zero
OC Hexachlorocyclopentadiene	0.05	Kidney or stomach problems	Discharge from chemical factories	0.05
IOC Lead	10.5, Action Level=0.015	Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits	zero
M Legionella	TT7	Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems	zero
OC Lindane	0.0002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, gardens	0.0002
IOC Mercury (inorganic)	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands	0.002
OC Methoxychlor	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock	0.04
IOC Nitrate (measured as Nitrogen)	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	10
IOC Nitrite (measured as Nitrogen)	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	1
OC Oxamyl (Vydate)	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes	0.2
OC Pentachlorophenol	0.001	Liver or kidney problems; increased cancer risk	Discharge from wood-preserving factories	zero
OC Picloram	0.5	Liver problems	Herbicide runoff	0.5
OC Polychlorinated biphenyls (PCBs)	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals	zero
R Radium 226 and Radium 228 (combined)	5 pCi/L	Increased risk of cancer	Erosion of natural deposits	zero
IOC Selenium	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum and metal refineries; erosion of natural deposits; discharge from mines	0.05
OC Simazine	0.004	Problems with blood	Herbicide runoff	0.004
OC Styrene	0.1	Liver, kidney, or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills	0.1
OC Tetrachloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry cleaners	zero
IOC Thallium	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories	0.0005
OC Toluene	1	Nervous system, kidney, or liver problems	Discharge from petroleum factories	1
M Total Coliforms	5.0 percent ⁶	Coliforms are bacteria that indicate that other, potentially harmful bacteria may be present. See fecal coliforms and E. coli	Naturally present in the environment	zero
DBP Total Trihalomethanes (TTHMs)	0.080	Liver, kidney or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection	n/a ⁷
OC Toxaphene	0.003	Kidney, liver, or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle	zero
OC 2,4,5-TP (Silvex)	0.05	Liver problems	Residue of banned herbicide	0.05
OC 1,2,4-Trichlorobenzene	0.07	Changes in adrenal glands	Discharge from textile finishing factories	0.07
OC 1,1,1-Trichloroethane	0.2	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories	0.2
OC 1,1,2-Trichloroethane	0.005	Liver, kidney, or immune system problems	Discharge from industrial chemical factories	0.003
OC Trichloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from metal degreasing sites and other factories	zero

LEGEND

D Disinfectant
DBP Disinfection Byproduct

IOC Inorganic Chemical
II Microorganism

OC Organic Chemical
R Radio nuclides